

ABSTRACT

5 A semiconductor wafer having two regions of different dopant concentration profiles is evaluated by performing two (or more) measurements in the two regions, and comparing measurements from the two regions to obtain a reflectivity change measure indicative of a difference in reflectivity between the two regions. Analyzing the reflectivity change measure yields one or more
10 properties of one of the regions if corresponding properties of the other region are known. For example, if one of the two regions is doped and the other region is undoped (e.g. source/drain and channel regions of a transistor), then a change in reflectivity between the two regions can yield one or more of the following properties in the doped region: (1) doping concentration, (2) junction or profile
15 depth, and (3) abruptness (i.e. slope) of a profile of dopant concentration at the junction. In some embodiments, the just-described measurements in the two regions are performed by oscillating a spot of a beam of electromagnetic radiation. In several such embodiments, as reflectivity is a function of wavelength of an incident beam, three sets of measurements are made using
20 laser beams of three different wavelengths, to obtain three reflectivity change measures (one at each wavelength). Next, the three reflectivity change measures are used to solve for each of three properties of the doped region, namely junction depth, doping concentration, and profile abruptness.